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Antibodies to maize in patients with Crohn's disease, ulcerative colitis and coeliac disease

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SUMMARY

The incidence of antibodies to maize using an immunofluorescent technique has been found to be 14% in controls, 33% in Crohn's disease, 50% in ulcerative colitis and 44% in coeliac disease. This result indicates that humoral immunity to maize is probably unimportant in the pathogenesis of Crohn's disease. The similar incidence of antibodies in the inflammatory bowel disease and coeliac groups suggests absorption of dietary antigen secondary to an increased mucosal permeability.

INTRODUCTION

The cause of Crohn's disease remains unknown although currently there is considerable interest in a possible aetiological role for viruses (Gitnick & Rosen, 1976; Whorwell *et al.*, 1977) and bacteria (Parent & Mitchell 1976, Burnham, Stanford & Lennard-Jones, 1977). Recently, James (1977) reported that, at the onset of their symptoms, 67·6% of patients with Crohn's disease were regularly consuming cornflakes, compared with 25% of controls. In the light of this significant finding we have investigated the incidence of antibodies to maize in patients with Crohn's disease, using a modification of the technique described for the detection of antibodies to wheat in coeliac disease (Eterman & Feltkamp, 1978).

MATERIALS AND METHODS

Thirty-three patients with Crohn's disease, thirty-six with coeliac disease and eighteen with ulcerative colitis were studied. Forty-one hospital controls without evidence of gastrointestinal disease were also assessed. Whole maize used in the manufacture of cornflakes (Kelloggs Ltd.) and wheat grain (Mardler variety) were embedded according to the method of Eterman & Feltkamp (1978). 5·0 mμ cryostat sections were cut, treated with a 1 in 10 dilution of serum, followed by appropriately diluted FITC-labelled sheep polyvalent anti-human globulin (Wellcome Reagents Ltd.) The sections were examined in a Zeiss Universal fluorescence microscope equipped with a IIIRS vertical illuminator. A positive reaction to maize was defined as grain showing fluorescence in both the protein matrix and the bran layer.

RESULTS

The results are shown in Table 1. It can be seen that although maize antibodies occurred in 33% of Crohn's disease patients compared with 14% of controls ($P = 0{\cdot}037$), the proportion in the other disease groups was even higher. The incidence of wheat antibodies found in Crohn's disease, ulcerative colitis and coeliac disease was in agreement with a previous report (Eterman & Feltkamp, 1978), and it is of interest that patients with coeliac disease on a gluten-free diet had a lower incidence of wheat, but not of maize, antibodies when compared with those patients not on a diet. Some sera contained wheat and maize antibodies but in general there was no correlation between the two. In addition,

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TABLE 1. Incidence of maize and wheat antibodies in patients with Crohn's disease, ulcerative colitis and coeliac disease

Group	Number	Maize antibody positive	Significance*	Wheat antibody positive	Significance*
Crohn's disease	33	11 (33%)	$P = 0{\cdot}037$	19 (58%)	$P = 0{\cdot}000035$
Ulcerative colitis	18	9 (50%)	$P = 0{\cdot}0054$	9 (50%)	$P = 0{\cdot}0027$
Total inflammatory bowel disease	51	20 (39%)	$P = 0{\cdot}0061$	28 (55%)	$P = 0{\cdot}000014$
Coeliac disease	36	16 (44%)	$P = 0{\cdot}0032$	21 (58%)	$P = 0{\cdot}000017$
Coeliac disease off GFD†	22	10 (45%)	$P = 0{\cdot}0079$	15 (68%)	$P = 0{\cdot}0000094$
Coeliac disease on GFD†	14	6 (43%)	$P = 0{\cdot}0307$	6 (43%)	$P = 0{\cdot}018$
Controls	41	6 (14%)	—	5 (12%)	—

* Patients *vs* controls (probabilities estimated either by the Chi-square test with Yate's correction or Fisher's exact test, as appropriate).

† GFD = Gluten-free diet.

absorption by wheat extract of sera containing both antibodies removed the wheat, but not the maize, antibody.

DISCUSSION

This study shows that although maize antibodies occur in 33% of patients with Crohn's disease, the incidence is similar to other diseases where mucosal permeability may be increased. This is in agreement with a recent investigation which showed an increased incidence of antibodies to bovine albumen in Crohn's disease, ulcerative colitis and coeliac disease (Falchuk & Isselbacher, 1976). To examine the possibility that wheat antibodies may give a positive reaction with maize, sera containing both antibodies were absorbed with a wheat extract. The absorbed sera still gave a positive reaction with maize indicating that the antibodies have separate specificities.

Although cell-mediated immunity was not assessed, this investigation shows that humoral immunity to maize appears not to play a significant role in the aetiology of Crohn's disease. If cornflakes or maize are important in the development of this disease, other possibilities could include an effect on or by the microbial flora of the gut, the production of a toxic metabolite by a defective intestinal enzyme or perhaps sensitivity to some other constituent of cornflakes.

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